REMARKS

The Examiner has rejected claims 1-43 under 35 U.S.C. §102(b) as being anticipated by Kashimura, et al. (U.S. 6,061,624).

Applicants have amended claims 1 and 35 to more particularly point out the invention. Currently pending are claims 1-43.

Introduction

Before discussing the Examiner's rejection, it might first be helpful to review the invention. Applicants present a method to compute a cylinder specific IMEP (indicated mean effective pressure) based on engine parameters measured in a typical engine such as air flow rate, ignition timing, and air-fuel ratio as well as an engine rotational acceleration deviation. The engine rotational acceleration deviation is computed based on a time history of engine speed. Applicants disclose a method to provide an estimate of the IMEP (or other engine output parameter) for each cylinder firing.

The Kashimura et al. reference cited by the Examiner "diagnoses a combustion state in the specific cylinder. Namely, the corresponding cylinder is judged to be misfiring[when the combustion state parameter of the specific cylinder exceeds the prescribe parameter." (See last 4 lines of Abstract.) This is consistent with Figures 9a and 9b in which it is shown that a misfire occurs when a combustion state parameter exceeds the threshold value, Dth. Kashimura et al. provide a two-state output: misfire or no misfire. This is in contrast with Applicants' invention in which a value for an engine output parameter is provided.

Amendment to the specification

Applicants have amended equation (2) of paragraph [0026]. The operator, namely the minus sign, was inadvertently left out in conversion by the electronic filing software. Furthermore, from paragraph [0025] states: "DACCEL,n is the deviation in engine rotational of the nth cylinder from average engine rotational acceleration (ACCELavg)," the word deviation implying a difference. Applicants submit that the amendment does not introduce new matter and respectfully requests that this amendment be entered.

Arguments related to independent claims 1 and 35

Applicants' claims 1 and 35 substantially contain the following limitation: "determining a performance parameter representative of engine output across a first group of cylinders based on an engine operating parameter, said first group of cylinders

comprising at least three cylinders." Within paragraph [0054] of the specification, Applicants provide examples of "a performance parameter representative of engine output:" IMEP, work, and torque. Kashimura et al. discuss torque in column 4, line 62 through column 5, line 10. Kashimura et al. show equations for D' and D as functions of torque in the middle of column 5. Thus, Kashimura et al. use a measure of torque as input to compute a value for D, combustion state parameter. Applicants, in contrast, show in equation 5, paragraph [0034] that IMEPall = c1 + c2 * AIR_CHG. Recall from paragraph [0054] that the equations within the specifications can be recast in terms of torque, so that alternatively: Tall = a1 + a2 * AIR_CHG, i.e., that torque for all the cylinders is the sum of a constant, a1, and a constant, a2, times the air charge (for the embodiment shown as equation 5). Constants c1 and c2 are recast as constants a1 and a2 to provide for units conversion between IMEP and torque, T. Applicants do not rely on a measure of torque. Instead, Applicants provide a way to compute torque based on a measure of air charge. In summary, Kashimura et al. use torque as an input to determine their combustion state parameter and Applicants obtain torque as an output.

A further distinction is that Applicants: "determin[e] a performance parameter representative of engine output across a first group of cylinders based on an engine operating parameter, said first group of cylinders comprising at least three cylinders" (emphasis added). Applicants determine the performance parameter over at least three cylinders. Kashimura et al., in equations 1 and 3 of column 5, consider the engine revolution speed, N, and engine torque, T, only for the present cylinder to fire, called n, and the prior cylinder to fire, n-1. Similarily, equation 11 near the bottom of column 9 considers only cylinder n and cylinder n-1, i.e., the prior to fire

Because Kashimura, et al. do not show: " determining a performance parameter representative of engine output across a first group of cylinders" and, further, do not show "said group of cylinders comprise[es] at least three cylinders" (emphasis added). Kashimura et al. cannot anticipate Applicants invention as claimed in independent claims 1 and 35. Applicants respectfully request withdrawal of rejections to independent claims 1 and 35 and to claims 2-14 And 36-43, which depend directly or indirectly from one of claims 1 and 35.

Arguments related to independent claims 15 and 29

Applicants' claim 15 shows: " determining a rotational acceleration average based on said rotational speed, said rotational acceleration average is averaged over all cylinders of

the engine." In claim 29: " said unit determining an engine rotational acceleration deviation for a single cylinder." Applicants submit that engine rotational acceleration deviation is defined in the specification as a difference between ACCEL,n and ACCELavg, where ACCEL,n is the engine rotational acceleration of the nth cylinder and ACCELavg is the median of the prior measures of ACCEL,n. Nowhere do Kashimura, et al. discues determining a rotational acceleration. The equations that Kashimura et al. present and the accompanying discussion are focused on rotational speed, N, which is alternatively called revolution speed by Kashimura et al. Applicants' rotational acceleration is the time rate of change of rotational speed, which is not shown anywhere in the Kashimura et al. reference. Kashimura, et al. cannot possibly anticipate either of the limitations shown by Applicants in claims 15 and 29 because Kashimura, et al. is silent about rotational acceleration. Kashimura, et al., therefore, do not anticipate claim 15. Withdrawal of rejections to independent claims 15 and 29 and rejections to claims 16-28 and 30-34, which depend directly or indirectly from one of claims 15 or 29, is respectfully requested.

No other art is cited in the Office Action. Based on the foregoing comments, the above identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No.06-1505.

Respectfully submitted,

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